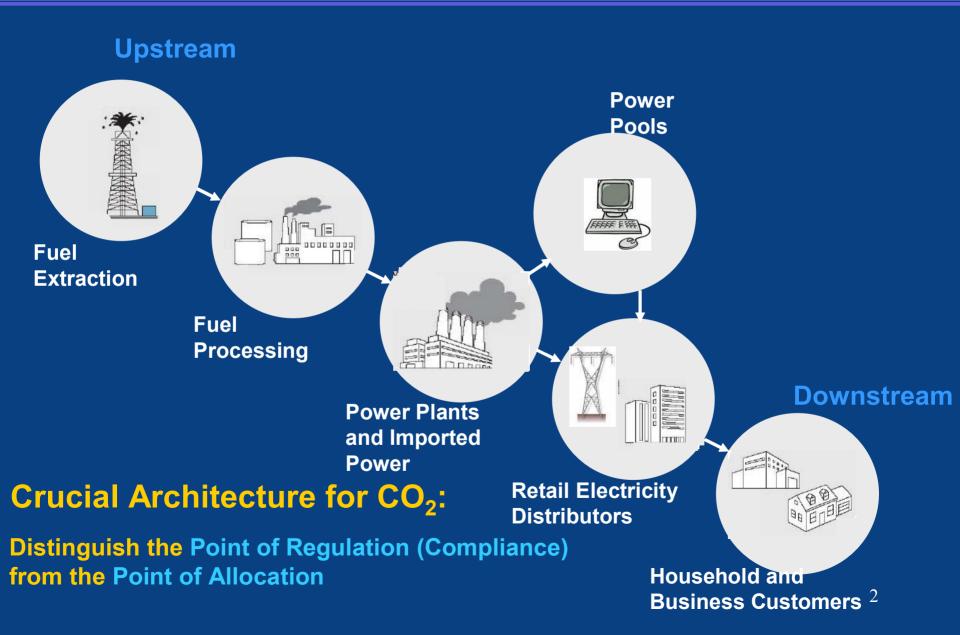
# **State Efforts to Cap the Commons: Regulating Sources or Consumers?**

Dallas Burtraw
Resources for the Future
December 18, 2007

Cap and Trade Webinar Series



#### Where in the Electricity Fuel Cycle Should GHG Policy be Enforced?



#### Where in the Electricity Fuel Cycle Should GHG Policy be Enforced?

- Upstream? If not, then one of the following:
- Source-Based Approach (SO2, NOx, RGGI, EU ETS)
- Load-Based Approach (PUC's approach)
  - Retail distribution company would surrender allowances for emissions used to meet load
  - Ex post estimates of emissions from instate and imported power

#### First-Seller Approach (MAC recommendation)

- Compliant party is entity that first sells power onto the grid
- For instate generation it is sources/marketers
- For imported power it is the party identified on transmission documents

#### YUCK! Who CARES!!!

### Conclusion: First-Seller Approach

- 1. PUC's LB approach was product of necessity. Now is time for more evaluation.
- 2. LB makes some sense, but it is not a market. It is increasingly flexible, increasingly smart regulation. It has poor incentives and accountability for emission reductions.
- 3. Organization and vision of GHG market and electricity market are inherently linked. LB is not consistent with market reform.
- 4. Justifications for LB about behavioral economics are imprecise.
- 5. The hidden agenda to soften electricity prices hinges on allocation to load, not LB compliance. Further, this is a reasonable political goal but bad architecture with no off-ramp under LB. This will create a "windfall to electricity consumption," raise allowance prices and social costs of GHG policy.

#### The Debate

#### Where there is a *Distinction* without a *Difference*

- 1. PUC current activities: portfolio planning, efficiency.
- 2. Impacts on customers and producers.
- 3. Imported power.

Where there is a <u>real</u> Difference

- 4. Administration and incentives.
- 5. Electricity market reform.
- 6. Integrity of emissions market.

Where the jury is out

- 7. Influence on regional/national policy.
- 8. Legal issues.

#### Where there is no real difference:

#### 1. PUC's Role

The PUC already plays an important role in assuring that dispatch meets social goals and in promoting energy efficiency:

- Loading order
- Procurement standard
- Environmental risk adder
- Metering
- Decoupling
- Shareholder and customer incentives
- Would these policies end, or should they end, if there is a GHG cap and trade system? NO
- Does it make a difference for these policies whether a load based of first seller approach is adopted? NO

#### 2. Impacts on Customers and Producers

- Where market determines price, wholesale power price effect is different, retail price effect is identical.
  - Incidence (burden) is determined by elasticity of supply and demand in the market, not where the regulation is applied.
- Impact on customers hinges on allocation
  - Crucial to recognize the distinction and separation of point of compliance from point of allocation.
  - Example: Under <u>auction</u> LB and FS have same price effect.

## 3. Imports

Information is the same under both approaches.

#### Where there is a <u>real</u> Difference:

### 4. Administration, Incentives

- Complexity of load based approach
  - Thousands of transactions hourly. True up and assignment of estimated emission rates (averages) would occur ex post.
- True-up of emissions will require use of averaging over sources in some cases.
- LB and FS share complicated treatment of imports, but the LB approach expands that to in-state power.

### 5. Electricity Market Reform

- LB: Perverse incentives in MRTU, markets
  - The bad will chase out the good in ISO's Day Ahead market.
- Practical issues
  - Greater self-scheduling raises costs in network.
  - What party is liable when LSE instructions to the ISO for self-scheduling cannot be fulfilled? Or when pool average emissions deviate in unanticipated way at truing up?
  - Organization and vision of GHG market and electricity market are inherently linked.

### 6. Integrity of emissions \*market\*

Requires that emissions covered by the cap-and-trade program be monitored, reported and verified. The LB approach:

- Inherent inaccuracies for in-state emissions as well as imports.
- Seriously erodes verification for ancillary services and DA market.
- Undermines value of clean investment, innovation.
- Certificates approach suggested as a remedy:
  - Problem: output subsidy to electricity raises allowances prices.

#### Where the jury is still out:

### 7. Influence on Regional/Federal Policy

- Under Western Climate Initiative the FS approach evolves into a source-based approach.
- LB: Not in play at federal level (although there are advocates for allocation to load).
- Indeed, helter skelter across the states might best promote federal action, but WCI would lose the chance to promote architecture at the federal level.

## 8. Legal Issues

Commerce Clause – consistent treatment Federal Power Act – FERC authority

#### Conclusion

First-seller approach is an architecture that can expand to an economy-wide, nation-wide cap and trade program.

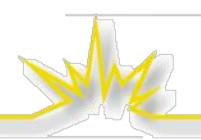
Stakes are high for customers, companies, and for the evolution of climate policy. It will be difficult to unwind if the WCI starts down the load-based path.

## Power System Carbon Caps: Opportunities, Costs and Design Choices

Cap and Trade Webinar Series

December 18, 2007

Richard Cowart



#### The Regulatory Assistance Project

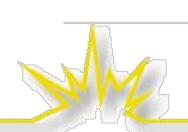
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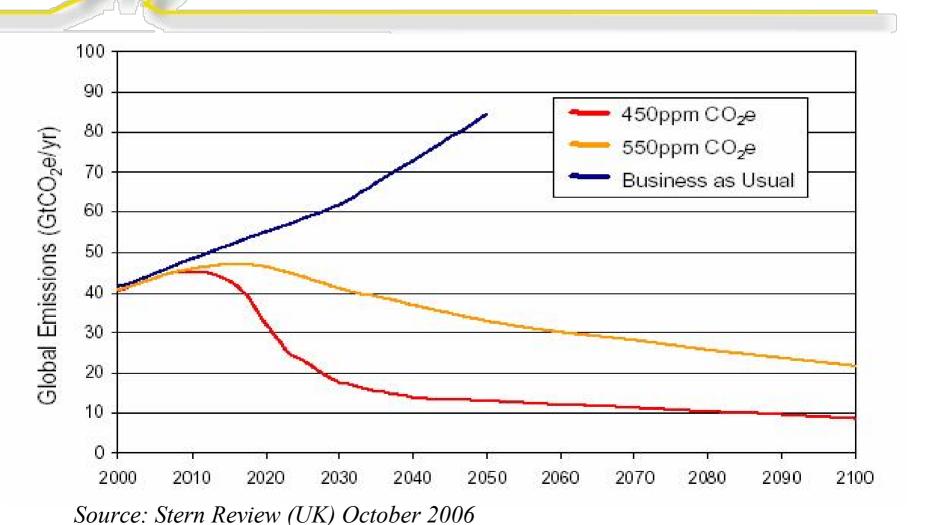


# The Regulatory Assistance Project

RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP is funded by US DOE & EPA, several foundations, and international agencies. We have worked in 40+ states and 16 nations.

Richard Cowart was Chair of the Vermont PSB, Chair of NARUC's Energy & Environment Committee, and of the National Council on Electricity Policy. Recent assignments include technical assistance to RGGI, the New York ISO, the California PUC, the Oregon Carbon Allocation Task Force, the Western Climate Initiative and to China's national energy and environmental agencies.

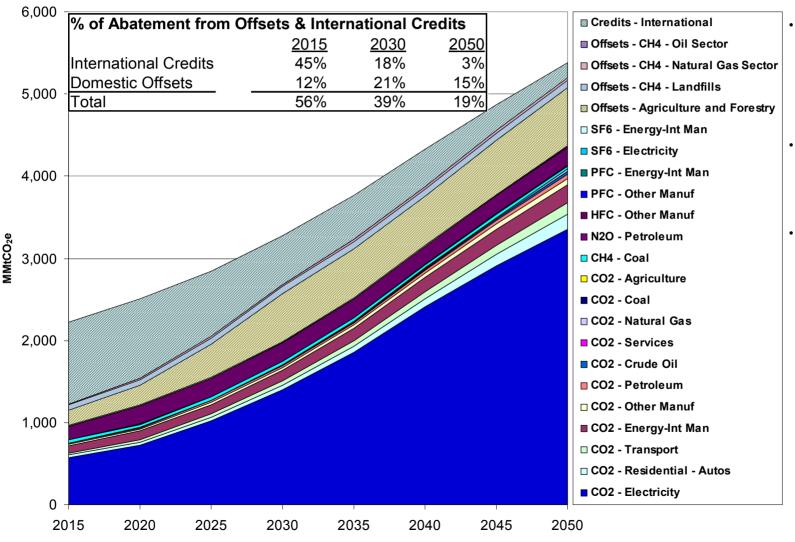
## We have a long way to go – we won't get there if consumer costs are too high



#### Power sector bears a lot of the burden

Sources of GHG Abatement

(ADAGE model--S. 280 Senate Scenario US EPA11-07)



- S. 280 allows offsets and international credits to make up 30% of the total allowance submissions requirement.
- The quantity of offsets allowed decreases as allowance submissions decrease.
- Since the quantity of offsets allowed is decreasing over time and the quantity of abatement is increasing over time, offsets make up a large fraction of abatement in the early years of the policy, and there contribution to total abatement decreases over time.

# Where will power sector reductions come from?

The logical sources of carbon reductions:

- Reduce consumption
- Lower the emission profile of new generation
- Re-dispatch the existing fleet

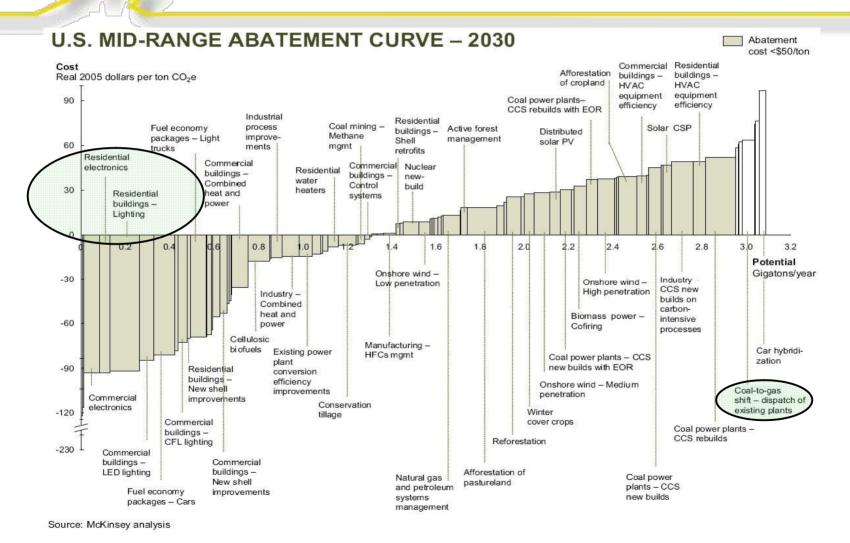
#### For each opportunity, ask:

- 1. How many tons will it avoid?
- 2. How much will it cost consumers per ton actually reduced? <not just the marginal abatement cost>
- 3. What tools get the best results on #1 & #2?

#### Policy Goals:

- (a) Lower the cost per ton for reductions in the power sector
- (b) Power consumers should pay for the incremental cost of a cleaner mix, but not a multiple of that cost
- (c) Expose power buyers and sellers to market-based carbon prices

# Carbon reduction costs and opportunities



# Which tools for the power sector?

#### A. Cap and trade options

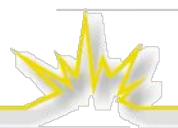
- 1. Generator-side cap and trade
  - Free allocation of allowances to generators
  - Auction of allowances generator buys them

#### 2. Load-side cap and trade

Free allocation of allowances to LSEs for consumers

#### B. Non-cap options

- 3. Portfolio Management policies only (no cap/trade) such as:
  - ♦ Energy efficiency programs inc. EEPS
  - Renewable Portfolio Standard (RPS)
  - Carbon Emissions Standard or Emissions Portfolio Standard (EPS)
- 4. Carbon tax (on generators or "upstream," on fuel)



### Two connected topics

#### The point of regulation:

- Where in the stream of commerce should the obligation to account for emissions be imposed?
- Upstream, Generator, or Load-serving entity?

#### Method of allocation

- Auction or free allocation
- If allocated, to whom, and what criteria?

Finally -- What criteria should we use to answer these questions?

#### What is the best point of regulation?

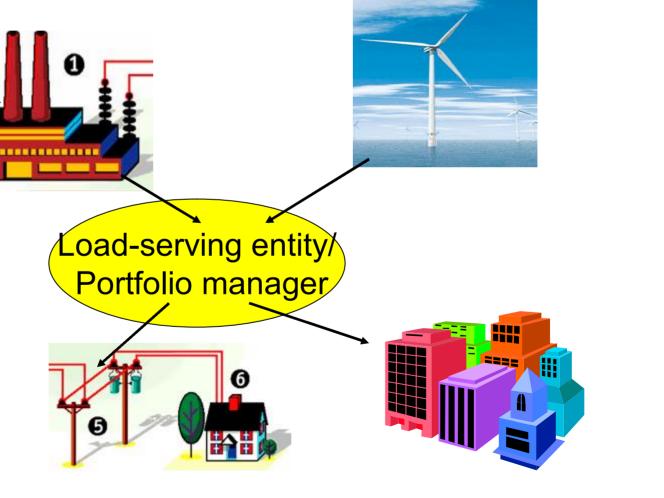
The LSE is in the center of the power system

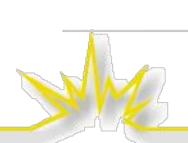
"Upstream" at mines, wellheads

Mid-stream at generation

Midstream at load-serving entities

Downstream at customer locations





## CA & OR approach: Load-Side Cap & Trade

Basic rule: LSEs must have credits to cover the emissions associated with their sales to retail customers.

- >> A "carbon budget" for the utility portfolio manager.
- Measure historic emissions associated with electricity serving the state (or region)
  - All sources, wherever located -- both in-state and imports
- Set "hard" emissions caps to lower impact in stages
- Distribute allowances ("carbon credits") to LSEs
- LSEs spend credits as needed to match their portfolio of sources
  - can sell excess credits from RE & EE choices



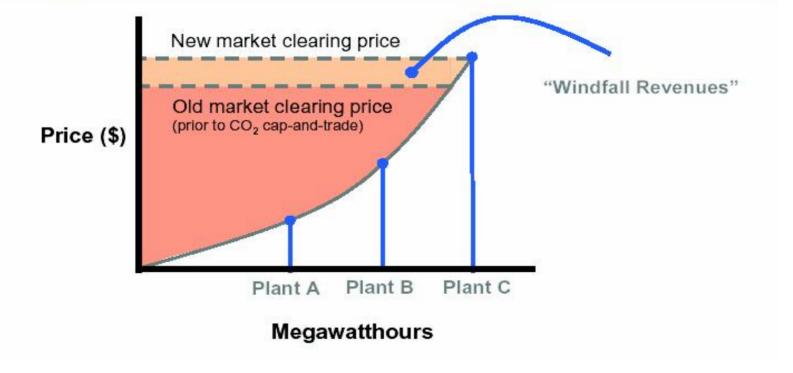
# Main advantages of a load-side cap

- Lower societal costs: directly promotes end-use (and distribution) efficiency, the lowest-cost lowcarbon resource
- Lower consumer costs: Lower cost to power consumers per ton reduced
- ➤ Environmental: lower consumer cost permits deeper GHG reductions over time
- Institutional: aligns with purchasing role of rateregulated distribution utilities – allows cost-based attainment
- Legal: content of retail sales is clearly within the jurisdiction of WCI states (e.g., RPS)
- Political: Avoids most windfall gains to generators without the cost, revenue diversion and political consequences of a multi-billion \$ auction

# Problem #1 Many generators make money with free historic allocation

Theoretical representation of "windfall revenues" A fossil unit on the margin increases the market clearing price (i.e., the price paid to all generating units dispatched) to reflect the cost of CO<sub>2</sub> compliance





# Citigroup Report on the Impact of the EU Carbon Market on European Utilities (up to 2007)



Utilities

12

So Winners and Losers?

- ■All generation based utilities winners
- ■Coal and nuclear generators biggest winners
- ■Hedge funds and energy traders even hely had the bigger winners
- ■Losers??....herm......Consumers!

Genoss Europe approx II Bon Flowed from consumers 7 also whits ) hely hands, et al

Citigroup Global Markets

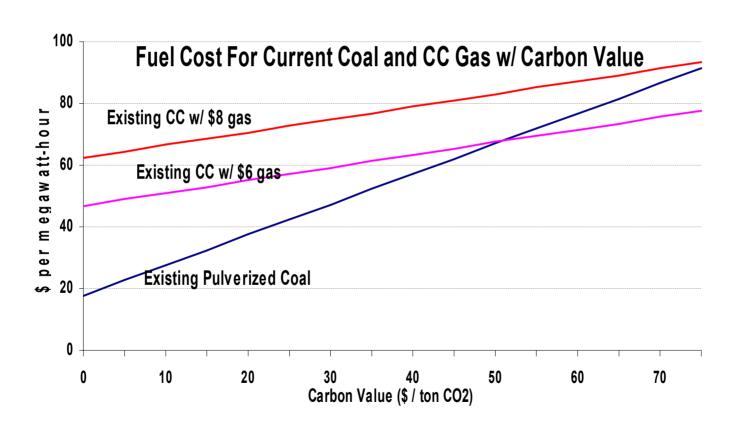
## Requiring generators to purchase allowances helps, but problems remain

- RGGI states and the MAC support auction or other sale to generators
- Auction is better than grandfathering, but three problems remain:

#### Ratepayers still pay more -

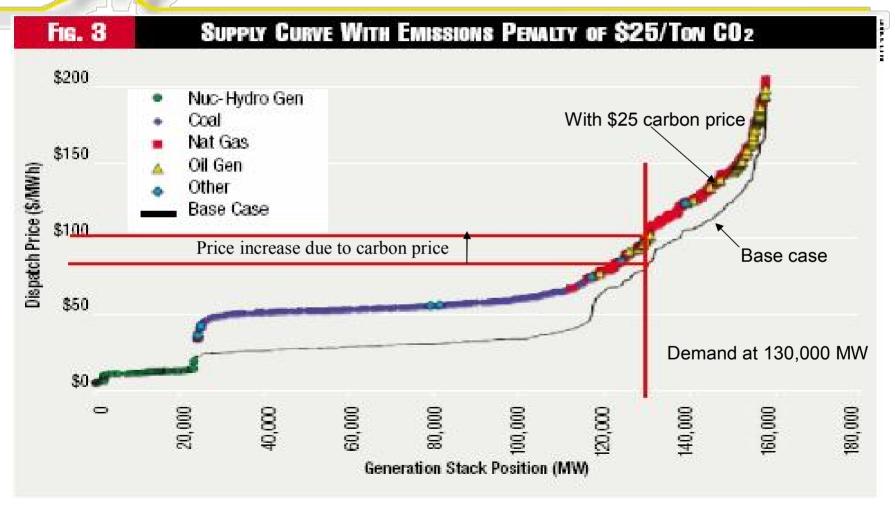
- Fossil generators will raise prices to cover carbon costs (this is intended); Applies even to fully-regulated units.
- Other generators will get windfall gains (a byproduct of higher fossil prices). Applies to all units getting market-based rates.
- <u>Auction revenue erosion</u> -- What happens to the revenue? Will it actually benefit ratepayers?
- <u>Realities of marginal generation costs</u> -- Raising power prices is an expensive way to improve the carbon footprint of the sector (see next slides).

## Problem #2: It takes a high carbon cost to change the dispatch of the existing fleet



Source, Howard Gruenspecht, Deputy Administrator, EIA, at NREL Energy Analysis Forum 11-07

Reality #2: Carbon taxes and auctions to sources can increase wholesale power prices with little effect on dispatch or emissions



Source: "The Change in Profit Climate: How will carbon-emissions policies affect the generation fleet?" Victor Niemeyer, (EPRI) -- <u>Public Utilities Fortnightly</u> May 2007 <some captions, demand and price lines added>

# Gen-side carbon costs can increase wholesale power prices with little effect on dispatch & emissions Modeling results from ECAR-MAIN and ERCOT

- ➤ In ECAR-MAIN (Upper Midwest, coal-heavy) a carbon charge of \$25/ton would raise wholesale power prices \$21/MWH.
  - "Even a CO2 value of \$50/ton would produce only a 4% reduction in regional emissions given the current generation mix."
- ➤ In ERCOT (Texas, gas-heavy) "when gas is selling for around \$8MMbtu, even a CO2 value of \$40/ton produces little emissions reduction" from the existing mix.
- > Thus, the most important tools to reduce emissions are new long-term investments.

Source: "The Change in Profit Climate: How will carbon-emissions policies affect the generation fleet?" Victor Niemeyer, (EPRI) -- Public Utilities Fortnightly May 2007

Load-side point: Portfolio management by LSEs is the more direct – and less costly – path to contracts for those new plants.

## Impact of a CO<sub>2</sub> Value on Fossil Fuel Prices

Fuel	CO <sub>2</sub> content per million Btu	Delivered Price (2005, all sectors, per million Btu)	Impact of \$10 per ton CO <sub>2</sub> value		Impact of \$50 per ton CO <sub>2</sub> value	
			\$	percent	\$	percent
Coal	0.094	1.57	0.94	59.9	4.70	299
Oil	0.074	18.60	0.74	4.0	3.70	19.9
Nat. Gas	0.053	9.65	0.53	5.5	2.65	27.5

<sup>•</sup>As shown above, placing a value on GHGs through either a tax or a cap-and-trade program has a relatively large impact on the delivered price of coal.

•A \$25/ton value on CO<sub>2</sub> raises gasoline prices by about 23 cents per gallon.

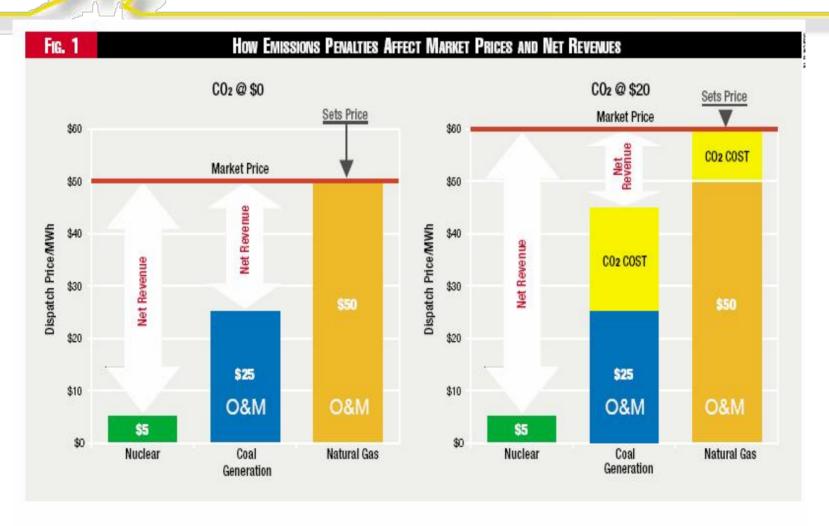
Source: EIA data

<sup>•</sup>This reflects both the substantially lower price of coal relative to other fossil fuels under baseline conditions and its higher emission of CO<sub>2</sub> per unit of energy

# Problem #3: carbon taxes and auctions create "high cost tons"

- ➤ Key point: Carbon price must be very high to save many tons through price alone (for gas to displace coal, etc.)
- > Fossil units almost always set the clearing price
- Short-term clearing price provides the benchmark for longer-term and bilateral contracts
- > SO: Carbon penalty on sellers raises prices in two ways
  - Even fully regulated fossil units are more expensive
  - ❖ Any other generators in wholesale markets capture "inframarginal rent" a/k/a "windfall gains", paid for by consumers

## Why Emission Charges Can Raise Prices Without Changing Dispatch or Emissions



Source: "The Change in Profit Climate" -- Public Utilities Fortnightly May 2007 -- Victor Niemeyer, EPRI

## Problem #4: Hard to affect demand with carbon taxes or price increases to consumers



## Good news: LSE-based EE programs are more powerful than rate increases

- Economic theory: just raise the price of power
- ➤ DSM reality: **Programs** are needed to surmount market barriers to efficiency
- ➤ Utility DSM experience: \$ spent through smart programs will deliver 5x to 13x the efficiency savings of \$ charged in higher prices
- Key conclusion: Build efficiency support into program architecture.
- > BUT: Generators don't deliver efficiency
- Hmmm...who has relationships with customers?

#### **Societal Costs**

#### Does the cap system promote investment in low-cost GHG reductions?

- ➤ The main purpose of cap and trade is to reduce emissions at the lowest cost to the economy
- Minor improvements (e.g., heat rate) possible at existing power plants and redispatch
- Essential large reductions will come from (A) energy efficiency and (B) new plant construction
- > (A) End-use efficiency is the lowest-cost way to reduce power sector GHGs.
- End-use efficiency does not spring from generators, or from rate increases, but from EE programs

Main point: LSEs are in the best position to deliver customer EE – aligns well with LSE carbon budget.

# Good news: Load-side caps and generation resources

- LSEs are portfolio managers
  - ❖ Hard quantitative cap provides a carbon budget for LSEs
  - What gets built is determined largely by contracts that LSEs are willing to sign
- Load-side cap provides a clear, market based carbon price signal – on the "buy" side
  - The carbon value of efficiency and clean resources are realized directly by LSEs
  - Providers still have to compete on total cost terms "clean competition" comes from the LSE budget, not a carbon tax.
- ➤ As with the RPS, paying a premium for what you want is better than paying a premium for every MWH, clean or dirty.



### Buy-side policies can directly lower GHGs – consider the RPS

- RPS is a content requirement on each LSE's portfolio
- Consumers pay more to get more wind, but don't also have to pay more for all nuclear and fossil MWHs.
- ➤ EIA analysis of national 25% RPS finds that this large RPS could lower power sector emissions by 22% by 2030 (Policy case v. Reference Case).
- But this RPS has a relatively small impact on total power costs:
  - \* "In the Policy Case, annual consumer expenditures on electricity are very close to those in the Reference Case through 2022, as the reduction in fuel prices caused by lower fossil fuel use for electric power generation outweighs the increased capital costs of new renewable generation capacity."
  - "Cumulative (undiscounted) expenditures for electricity for the period 2009-2030 are about \$65 billion (about 0.8 percent) higher than in the Reference Case, while cumulative discounted expenditures are \$15 billion (0.4 percent) higher."
- Compare this impact to the cost of a carbon tax or auction that raises the price of all MWHs (see EPRI study – even very large increases in fossil prices and total power costs yield small carbon savings)

## Auction and allocation issues – Load-side cap gives us better options

- The point of regulation does not dictate the point of allocation
- Greatest savings will come from mobilizing low-cost efficiency as a resource.
- One option: Gen-side cap with auction
- ➤ Better option: Load-side cap with load-side allocation auction not necessary, trading possible

#### What are the stakes in the US?

- ➤ A carbon trading program could distribute allowances or revenues worth \$40-100 billion dollars/ year
  - In contrast, the SO2 program distributed \$1-2 billion per year of allowances
- Allocation is politically difficult and not likely to benefit average consumers
- ➤ If we have a generator-side cap, generators start with an "equitable" claim to free tons
- ➤ A load-side cap permits allocation to regulated LSEs for the benefit of those paying the bills

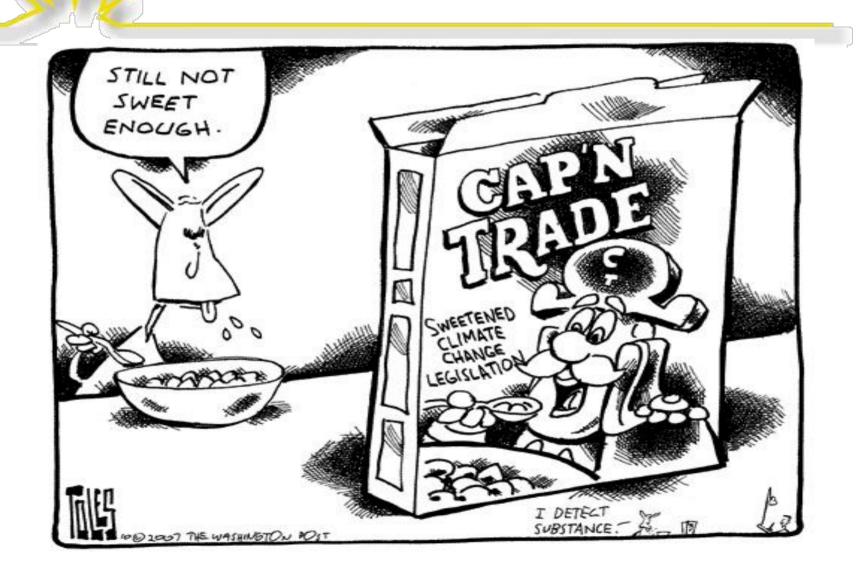


- New idea: Allocate up to100% of initial carbon credits to consumer representatives (eg, distribution utilities, Efficiency Utility)
  - ❖ RGGI MOU state minimum commitment is 25%
  - Most states will be higher Vermont law is 100%; MA, NY, NJ, CT all considering high %s
- Generators need to purchase allowances, recycling their windfall revenue BACK to consumers
- > PUCs supervise use of the \$\$ for benefit of consumers
- Best result: focus these \$ on investments that lower carbon (EE &RE)
- Results: lower cost per ton avoided, lighter macroeconomic impact >> quicker progress in reducing GHG emissions

#### Will the money really get back to consumers?

Or to efficiency programs?

-- Can we avoid a K-Street free-for-all?



## Allowance Distribution in Legislative Proposals (% of total U.S. allocation)

Bingaman/Specter	Lieberman/Warner (10/18/07)		
<ul> <li>Initial free allocation to industry: 53%</li> <li>Electric power (generators): 29%</li> <li>Carbon-intensive industry sectors: 10%</li> <li>Coal mines: 6%</li> <li>Petroleum refineries: 4%</li> <li>Natural gas processors: 2%</li> </ul>	<ul> <li>Initial free allocation to industry: 50%</li> <li>Elec.power: 30%</li> <li>20% to generators</li> <li>10% to load</li> <li>Industry emitters: 20%</li> </ul>		
• Non-CO <sub>2</sub> facilities: 2%	Other allocation: 26%		
Other allocation: 23%			
➤ States: 9%	<ul> <li>States and tribes: 9%</li> </ul>		
Agricultural sequestration: 5%	<ul> <li>Ag. and forestry sequestration: 5%</li> </ul>		
Early reduction: 1%	<ul> <li>International forestry protection: 3%</li> </ul>		
Geologic sequestration: 8%	<ul> <li>Early reduction: 5%</li> </ul>		
Initial Auction: 24%	<ul> <li>Geologic sequestration: 4%</li> </ul>		
<ul> <li>Transition to 53% auction by 2030</li> </ul>	Initial Auction: 24%		
113.13.13.11	<ul> <li>Transition to 57% auction by 2030</li> </ul>		



# Strategic and political questions

Even if Gen cap+auction and Load Side C&T cost the same

- To provide the same protections a Gen-side cap would require 100% auction. Do we believe we will get 100% auction?
- Gen-side requires returning all benefits to consumers. Even if Congress creates an auction, do we believe this will happen?
- Look at Congress what % is sold, what fraction of total costs is returned to power consumers?
- The art of cap and trade design is evolving RGGI, ETS, Oregon, California are taking new approaches and learning from implementing older ones
  - E.g., RGGI consumer allocation is a major innovation, not previously expected
- CA and WCI can set the stage for Congress
  Why preemptively preempt better state solutions?
- If we adopt a system that is expensive for consumers it will be harder for the nation ever to meet deep reduction goals.

### Conclusion: Manage electric carbon from the portfolio UP, not just the smokestack DOWN

- Realistic power solutions require **utility-based policies** not just higher carbon prices. Savings come from:
  - **Demand reductions.** Energy efficiency comes from EE programs, not much from prices.
  - Clean new capacity. RPS, load-side cap and other buyer-based policies add low-carbon resources at lower cost to consumers.
  - Price pressure on existing fleet can deliver some savings load-side cap provides "buyer price pressure" on generators.
  - Load-side cap for LSEs builds on their EE and portfolio management roles

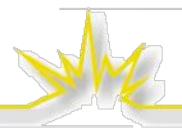


### Load-side cap FAQs

- ➤ How can we assign emissions to MWHs?
  - Tracking for most MWHs (see APX software), assignment rules for others (as in many other power market attributes)
- Can you have a fluid spot market with a load-side cap?
  - Yes either assign "blend" rate to all spot MWHs, or sell tags for spot market MWHs separately
- What are the rules for allocating credits ("carbon budgets") to LSEs?
  - ❖ Each state can decide. Historic, output-based, per-customer, and mixed options are all possible.
- What about legal issues?
  - Load-side cap is the most immune to commerce clause and Federal Power Act challenges

# World-view differences between first seller and load-side caps

	First Seller Cap	Load-Side Cap
Basic concept	Carbon tax	Carbon budget
Point of regulation	Midstream seller	Midstream buyer
Reductions come from	Power market price effects	Portfolio management
End-use efficiency	Collateral	Integral
Electricity	Commodity electrons	MWHs with attributes
Credit distribution	Auction to sellers	Allocation to buyers
Analogy	UK pool, Acid Rain	RPS, IRP



#### For more information...



- "Another Option for Power Sector Carbon Cap and Trade Systems Allocating to Load" (May 2004)
- "Why Carbon Allocation Matters Issues for Energy Regulators" (March 2005)
- "Addressing Leakage in a Cap-and-Trade System: Treating Imports as Sources" (November 2006)
- "Why A Load-Based Cap?" (March 2007, with Julie Fitch)
- "Load-Side Caps for Power Systems: Environmental and Economic Goals" (August 2007)

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